

REMARKS

In response to the Examiner's request that the applicant resubmit an oath/declaration, a copy of a facimilie of the inventor's signed declaration is attached.

Claim 14 has been deleted as lacking a proper antecedent basis. Claims 1, 2, 4, 6-15, 17, 19, 21, 23, 25, and 28-40 have been deleted to more clearly define the invention.

Claims 3, 5, 16, 18, 20, 22, 24, 26 and 27 are amend to recite a chemical composition consisting of a Group III base oil combined with specific alkylated naphthalenes. Support for the amendment is found in the specification at paragraphs [0005] to [0025] and in originally filed claims 1-40. No new matter is introduced by the amendment. Entry thereof is requested.

RESPONSE

The claims now pending are claims 3, 5, 16, 18, 20, 22, 24, 26 and 27.

The Examiner has rejected the originally filed claims on several grounds each of which is responded to as follows.

Rejection under 35 U.S.C. § 102(b)

Claim 5 was rejected as being anticipated by Moore et. al. Claim 5 has been amended to depend on Claim 3 and now recites a composition comprising a Group III base oil, an alkylated naphthalene and an additive package consisting of antioxidants, dispersants, antiwear additives, extreme pressure additives, rust and corrosion inhibitors, copper metal passivators, viscosity index improvers, and friction modifiers.

A review of Moore et al. shows that it describes a combination of fractionated oils with a polyaromatic compound comprising diaromatic hydrocarbons co-fused with naphthalene rings. It does not describe or disclose a Group II base oil, which is a hydroprocessed oil and not a fractionated oil. It does not disclose or describe alkylated naphthalenes. Since Moore does not disclosed the combination of claim 5, under the law no anticipation can be found.

Rejection under 35 U.S.C. § 103

Claims 3, 6, 7, and 15-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Moore et al.

As amended, claim 3, and claims 5, 16, 18, 20, 22, 24, 26 and 27 dependant thereon are directed to a chemical composition consisting of a Group III base oil combined with specific alkylated naphthalenes where the alkyl groups are straight-chain C₆ to C₃₀ alkyl groups.

Applicants have found that the specific combination in the claimed invention provided an improvement in lubricating performance that is surprising and unexpected. This is shown by the extent by which the kinematic viscosity and the pour point temperature are lowered. A comparison of these lubricating properties of the composition described in the Moore patent and the present invention is as follows:

Lubricating Property	Claimed Invention, App. 09/898,844, Table 3			Moore et. al. Examples	
	Example 1	Example 2	Example 4	Moore 1	Moore 2
Kinematic Viscosity at 100°C	7.4	4.6	8.0	26.7	16.4
Kinematic Viscosity at 40°C	44.9	51.2	56.0	n/a	453
Pour Point	-21°C	-24°C	-21°C	13°C	12°C

The composition comprising the alkylated naphthalenes and the Group III base oil of the present invention unexpectedly achieves superior kinematic viscosity and pour point properties. The invention here achieved a kinematic viscosity improvement of 8.4 to 12.1 cSt at 100°C and 397.0 to 408.1 cSt at 40°C. The pour point values dropped at least 33°C. See attached Hessell Declaration. This reduction in pour point is especially valuable because the previous invention was unable to be poured at temperatures below freezing. Therefore, the composition of the present invention can be used in the winter where Moore et. al composition could not.

Moreover, Moore et al., Column 1, lines 35 to 44 taught the use of non-specific naphthenic hydrocarbons as a lubricant:

[F]rom about 60% to 90% of predominantly saturated paraffinic lubricating oil distillate components, which generally are non-straight chain paraffinic hydrocarbons, preferably being a saturate fraction consisting essentially of naphthenic hydrocarbons of one or more rings and up to about 20% isoparaffinic hydrocarbons, and (2) from about 5% to about 40% of polyaromatic hydrocarbons containing two or more aromatic nuclei such as diaromatic hydrocarbon fractions containing co-fused therewith naphthenic rings.

Thus Moore et al teach that to achieve lubricating properties, two different oil distillates are to be used, non-straight chain paraffinic hydrocarbons and a polyaromatic hydrocarbon containing co-fused naphthenic rings.

Further, the Moore reference at Lines 41 to 44 of Column 1 disclose the use of large polycyclic aromatic compounds or large branching hydrocarbon groups in the composition consist of "hydrocarbons containing two or more aromatic nuclei such as diaromatic hydrocarbon fractions containing cofused therewith naphthenic rings..." Polyaromatic compounds of this description are relatively large since Moore teaches that the compounds contain four or more aromatic nuclei. At lines 45 of Column 1, Moore teaches the use of "non-straight chain paraffinic hydrocarbons" such as, "alkyl naphthenonaphthalenes" substituted with non-straight chain alkyl groups. The alkylated naphthalenes of the present invention are not large polyaromatic compounds with four or more aromatic nuclei.

The present invention is a departure from the teachings of Moore in three significant ways. First, the present invention is directed to the use of much smaller alkylated naphthalenes. These naphthalenes consist of only an aromatic nuclei, naphthalene, substituted with a C₆ – C₃₀ alkyl chain. These compounds contrast with Moore's hydrocarbons of four or more aromatic nuclei substituted with large alkyl groups. Second, the substituted alkyl used in the present invention are straight chain C₆ and C₃₀ alkyl. Whereas, Moore teaches alkyl groups that are non-straight chain hydrocarbons. Third, the base oil in Moore is entirely different from the Group III base oils of the present invention. Lines 30 to

34 of Column 1 teach that the Moore invention is obtained by fractioning and re-blending crude oil. In contrast, Group III base oils are obtained through severe hydroprocessing.

In order to establish § 103 *prima facie* obviousness, it is necessary to determine if the differences between the prior art and the present application are taught or suggested by the prior art. Nothing in Moore suggests using a Group III base oil, since Group III base oils did not exist at the time the Moore patent was filed or issued. Further, Moore teaches away from the alkylated naphthenes of the present invention by teaching the use of large polyaromatic compounds substituted with non-straight chain alkyl groups. Moreover, the data obtained by the Applicant showed vast improvements in lubricating properties that are surprising and unexpected. Thus, Applicants respectfully submit that the invention disclosed in the present application is not obvious, since much improved properties in kinematic viscosity and pour point was obtained using the composition of the present invention, an improvement that is surprising and unexpected in view of the teaching of Moore et al.

Applicant also found another advantage of the present invention in that the claimed compositions are not carcinogenic.

Carcinogenicity

It is well known in the industry that unrefined and mildly-refined base oils are carcinogenic. Without additional processing, mineral oils and crude oils contain quantities of the cancer-causing polycyclic aromatic compound (referred to as PAC, PCA and PAH, hereinafter PAH). ORGANIZATION RESEARCH COUNSELORS INC., Management of Metal Removal Fluid Environment, More Information: Petroleum Base Oils, (Jan. 10, 2000), at <http://www.aware-services.com/orc/more.htm>; U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, Report on Carcinogens, Mineral Oils (10th ed. 2002), available at <http://ehp.niehs.nih.gov/roc/tenth/profiles/s114mine.pdf> (hereinafter Report on Carcinogens). PAHs are known to cause skin tumors, cell neoplasms and reticulum cell sarcomas in animal tests. Report on Carcinogens. A copy of these documents are enclosed for the Examiner's reference.

On the other hand, Applicants found that hydroprocessed oils do not have carcinogenic properties. Hydroprocessing essentially eliminates the carcinogenic potential of unprocessed base oils by saturating the compounds and chemically disrupting the ring structures that are known in the art to be the source of carcinogenic activity, Metal Removal.

Moore et. al. discloses a "mineral lubricating oil" containing "saturated hydrocarbons of lubricating viscosity consisting of up to 20% isoparaffins and the balance being naphthenes." These compositions are obtained by fractioning crude oil. Unlike hydroprocessing, the fractioning process does not remove all of the PAHs.

Moore et al specifically describe the use of benzanthracene, benzofluoranthene, dibenzoacridine, dibenzoanthracene, dibenzopyrene, and 5-methylcrysene. These compounds are listed on the U.S. Department of Health and Human Service's list of carcinogenic polycyclic aromatic compounds. Report on Carcinogens, available at <http://ehp.niehs.nih.gov/roc/tenth/profiles/s150pah.pdf>. Therefore, it is clear that the Moore et al lubricants contain carcinogenic polycyclic aromatics and are undesirable.

On the contrary, the composition in the present application is free of cancer causing compounds. Group III oils are those subjected to severe hydroprocessing to remove non saturation, thereby eliminating carcinogenic potential. The Group III base oils of the present invention are subjected to hydroprocessing and are considerably safer than base oils obtained by fractionation of crude oils.

Additionally, the alkylated naphthalenes that fall into the present claims are non-carcinogenic. For example, section eleven of the Material Safety Data Sheet for Exxon Mobil's "MCP 917" shows that mono(16) alkylated naphthalene yields a negative test for carcinogenic effects. Additionally, section eleven of the Material Safety Data Sheet for Exxon Mobil's "Synesstic 12" shows that di(C14) alkylated naphthalene has no carcinogenic properties. Additionally, King Industries commercially produces cancer-free embodiments of the claimed naphthenic

additive in its "NA-LUBE" KR series of oils. The specific compounds found in the "KR" series contain monododecylnaphthalene, monotetradecylnaphthalene, didodecylnaphthalene, ditetradecylnaphthalene, tridodecylnaphthalene, tritetradecylnaphthalene, tetradodecylnaphthalene, tetratetradecylnaphthalene, and pentatetradecylnaphthalene. See Hessell Declaration. These compounds do not appear on the list of carcinogens published by the U.S. Department of Health and Human Services. See Report on Carcinogens.

Whether a compound has potential to cause cancer can be measured using the Institute of Petroleum's "IP-346" test that yields the weight percent content of PAH's. Oils with a PAH content of more than three percent have been shown to cause cancer in animal tests. Lars-Inge Jansson, Oil Harmless When Properly Handled, NAPHTHENICS (1992), available at http://www.marathon.se/nynas/start/article.cfm?Art_ID=767. Compounds that return an IP-346 percentage of less than three percent are considered non-carcinogenic.

The IP-346 test shows that the present invention contains a negligible amount of PAH's and are considered to be non-carcinogenic. Two representations of the alkylated naphthalene additive, King Industries' "NA-LUBE" KR-015 and "NA-LUBE" KR-019, were tested. The results show that KR-015 consisted of only 0.86% PAH's and KR-019 had only a 0.3% PAH. See Hessell Declaration, Exhibits A and B (KR-015 is designated "ATS Lab ID: 25922" and KR-019 is designated "ATS Lab ID: 28085"). The amount of PAHs found is very low and is regarded as non-carcinogenic. These results demonstrate that the alkylated naphthalenes of the present application is non-carcinogenic.

Based on the results of IP 346, the compositions of the present invention show a significant difference with respect to carcinogenicity as compared with the Moore et al. compositions. The IP-346 test of the Moore et al. composition consisted of 19.3% PAHs which is considered carcinogenic. See Hessell Declaration, Exhibit B (Moore et al. is designated "ATS Lab ID: 28086"). The synthetic alkylated naphthalenes and the hydroprocessed Group III base oils of the claimed invention have superior lubricating properties that are surprising and

unexpected and also proven to be free of cancer-causing compounds. Thus, the claims as amended cannot be regarded as obvious in view of Moore et al.

No other issues were raised by the Examiner. It is believed that the claims as amended are allowable and an early allowance is requested.

Respectfully Submitted,



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